Periodic Seasonal Time Series Models with applications to U.S. macroeconomic data

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Many time series encountered in economics and in natural sciences display regular seasonal fluctuations. In the analysis of such series, seasonal variation can be directly incorporated in the model or removed from the series by seasonal adjustment methods which can implicitly or explicitly rely on seasonal models. But sometimes the seasonal variation is not constant over the length of the time series. When the variation is allowed to be a deterministic function of the seasonal index, the resulting models are then referred to as periodic seasonal time series models.

This thesis describes and analyses several types of periodic seasonal time series models, including periodic formulations of autoregressive moving average (ARMA) and unobserved components (UC) models. It mainly focuses on the analysis of seasonal macroeconomic time series where UC models are extended by having periodic coefficients for different components. Throughout the thesis, specific attention is given to identification of the parameters before estimation is conducted. Further it is shown that exact maximum likelihood estimation is feasible despite the large number of parameters that are typically encountered in this class of periodic models.

Irma Hindrayanto (1980) received her MSc in Econometrics from the Vrije Universiteit (VU) in 2003. Thereafter she enrolled as a graduate student at the Tinbergen Insititute (Amsterdam) and started her PhD research at the same university under supervision of prof.dr. S.J. Koopman and dr. M. Ooms. She performed part of her research as an intern at the U.S. Census Bureau, Washington DC in autumn 2007 where she stayed for four months. In the last year of her research, she became a lecturer for Introductory and Intermediate Econometrics at the VU. Since December 2010, Irma is employed as an economist and model developer at De Nederlandsche Bank (Dutch Central Bank).

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503

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